AN INVESTIGATION OF THE RELATIONSHIP BETWEEN COMPLICATION AND COMORBIDITY CLINICAL CODES AND THE FINANCIAL HEALTH OF A HOSPITAL

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ABSTRACT

In 2008, the Centers for Medicare and Medicaid Services (CMS) revised the way it pays hospitals for Medicare inpatient admissions using a payment system called Medicare-Severity-adjusted Diagnostic Related Groups (MS-DRGs). The MS-DRG system uses "*major complication/comorbidity*" (MCC) and "*complication/comorbidity*" (CC) diagnosis codes to better identify the severity of inpatient cases. Payment rates for a hospital are established based on MS-DRGs which in turn are based on the diagnoses and procedure codes. MS-DRGs gave hospitals a financial incentive to improve coding of patient encounters. As a result CMS stated that a 2.9% coding offset would be implemented for all hospitals in 2011 to recoup potential overpayments resulting from changes in coding practices. The question of whether CMS's decision to implement a 2.9% coding offset surfaced since the financial health of some hospitals may have been hurt by the offset. Thus, the purpose of this study was to: 1) investigate whether hospitals differ in capturing MCCs and CCs codes based on hospital setting, bed size, and regional location, and 2) determine if there was a relationship between hospital MCC and CC coding and the financial health of hospitals as defined by the hospital case mix index. Data was analyzed for 1685 hospitals using the Medicare Final Rule Impact File and the Healthcare Cost Report Information System File. A statistically significant difference was found for hospitals in the West South Central region of the country as compared with Mountain, New England, Pacific, and South Atlantic regions. Study results suggest that, regionally, an across the board offset may have hurt some hospitals, thus consideration

should be given to re-examining a fairer method of payment based upon hospital demographics.

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CHAPTER I

INTRODUCTION

High-quality clinical coding practices are a necessity for healthcare facilities to receive proper reimbursement for services provided to patients. Currently, in the United States, the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) system is used to code and classify diagnoses and procedures based on the care and treatment rendered to patients by health care providers. Many uses of coded data exist today, although the original purpose for diagnostic and procedural coding was for statistical and research use (Zeisset 2010). Today, one of the most important purposes of clinical coding in the U.S. is for healthcare reimbursement.

Healthcare facilities rely on accurate coding and billing practices in order to maintain financial viability. Medicare is the largest single payer of healthcare services, and therefore the level of Medicare payment is a critical driver of a hospital's financial performance. Services provided to Medicare beneficiaries (patients) in an acute care hospital have associated charges that are recorded on a claim along with ICD-9 procedure and diagnosis codes. These codes describe the services provided to the patient and their health status. The claim is submitted to Medicare for reimbursement, so it is imperative that the data on the claim is accurate in order to receive correct payment for services rendered. The Centers for Medicare and Medicaid Services (CMS) is the government body that oversees the Medicare claims reimbursement process. It is well aware of the complexity of the process and ways in which errors may occur. Such errors can result in

payment denials and/or questions of fraud, thus careful attention is paid to the reimbursement determinations set forth by CMS.

Background of the Problem

CMS reimburses inpatient acute care hospitals through an inpatient prospective payment system (IPPS) whereby the amount of payment is determined in advance of services rendered with rates set on an annual basis. The IPPS uses the classification scheme Diagnosis Related Groups (DRGs) to group cases that use similar resources into categories for payment purposes.

DRGs are used to establish the payment rates for hospitals, and the DRG patient classification methodology is also used to calculate a hospital's Medicare case mix index (CMI). Each DRG is assigned a weight based on the resources required to treat a patient assigned to that DRG. The relative weight is multiplied by a fixed dollar amount or base rate to determine the payment for a Medicare inpatient claim. The Medicare CMI for a given hospital is the average DRG weight for discharges from that hospital. Casto and Layman (2011) define case mix index as the "single number that compares the overall complexity of the healthcare organization's patients to the complexity of the average of all hospitals". Complication/comorbidities (CC) are illnesses or injuries that coexist with the condition for which the patient is primarily seeking healthcare services and are a factor in determining CMI (Casto and Layman 2011). At least 75% of patients with CCs often experience a greater length of stay by at least one day in contrast to similar cases who do not have a CC (Safran, et al. 1987). To determine if a diagnosis meets the criteria of a CC, Casto and Layman (2011) outline the following questions to consider:

- Does this condition require intensive monitoring?
- Does this condition result in the use of expensive services?
- Does this condition result in extensive care requiring a greater number of caregivers?

Some of the conditions considered to be a CC include significant acute diseases, acute exacerbations of chronic conditions, advanced to end-stage chronic diseases, and chronic diseases associated with extensive debility (Casto and Layman 2011).

In fiscal year (FY) 2008, CMS revised the DRG system to include a severity-adjusted DRG system known as the Medicare-Severity DRGs (MS-DRGs). The goal of this revision was to improve Medicare's ability to recognize the severity of illnesses of hospital inpatients so that hospitals providing services to sicker patients receive higher payments and less severe cases receive a decreased payment (Schraffenberger 2012). The MS-DRG system uses major complication/comorbidity (MCC) and complication/comorbidity (CC) diagnosis codes to better identify resource consumption based on the severity of cases. Along with the DRG revision to MS-DRGs, CMS revised the CC list which impacted the percent of patients who were assigned to a higher-weighted MS-DRG (Casto and Layman 2011). According to CMS, MS-DRGs better reflects the severity of a patient's condition and thus, more accurately provides payment for the inpatient services rendered.

A hospital's payment is determined by the hospital's base payment rate and an MS-DRG relative weight for a case. An MS-DRG's relative weight represents the average resources required to care for cases in that particular DRG in comparison to the national average of resources used to treat all Medicare cases (Schraffenberger 2012). Higher relative weights indicated a greater use of resources to treat the associated diagnostic grouping, thus a higher payment to the hospital. An individual hospital's

payment rate is based on a regional or national adjusted standardized amount that considers the type of hospital and the wage index for the demographic area in which the hospital is located (Schraffenberger 2012). When IPPS was implemented in 1983, urban hospitals, teaching hospitals, and large hospitals according to bed size had higher than average case mix indices and experienced the largest case weight increases through the next several years following IPPS implementation (Steinwald and Dummit 1989). Even today, the rate of case mix change varies from hospital to hospital and continues to be an important factor with IPPS.

Evidence of case mix change since the beginning of IPPS indicates the strong influence of financial incentives on documentation and coding practices. In order for a hospital to receive accurate payments from CMS for Medicare patients, the completeness and accuracy of a patient's medical record is critical, especially if a hospital has a high case mix or proportion of complex cases. The discharge summary of a patient's medical record is the key source for coders to assign clinical codes which determines the appropriate MS-DRG. Additional diagnoses can be indicative of a more complicated and costly hospital stay, so thorough practice of documenting secondary diagnoses provides a greater opportunity for CCs and assigning a higher weighted MS-DRG. The sequencing of the additional diagnoses can result in a higher or lower payment to the provider. If errors in coding CCs due to insufficient documentation in the medical record or competence of the clinical coding staff are prevalent, the facility is at risk of receiving improper payment.

The implementation of MS-DRGs gave hospitals a financial incentive to improve documentation and coding of patient encounters to more fully account for the severity of

patient conditions. Concern was raised by CMS that potentially hospitals would be overpaid post-implementation of MS-DRGs due to improvements in hospital coding of patient severity. Improvements in coding could increase payments without a true increase in patient severity of resource consumption. To account for the uncertainty of how Medicare reimbursement would be affected by the MS-DRG system, Congress passed the ""TMA, Abstinence Education, and QI Programs Extension Act of 2007". Under this act, the Secretary of Health and Human Services was granted the right to apply prospective documentation and coding adjustments for acute care inpatient discharges that occurred in FY 2008 and FY 2009.

The authority of the Secretary as determined by the 2007 Congressional law was exercised when CMS released the IPPS FY 2011 final rule declaring a "coding offset" of 2.9 percent to recoup increased payments that were made to hospitals during FY 2008 and FY 2009 as a result of the MS-DRG implementation. CMS conducted a nationwide analysis in FY 2007 and FY 2009 and determined that coding and classification changes increased aggregate hospital payments without corresponding increase in the actual patient severity of illness, thus resulting in the need to cut hospital payments by 2.9 percent. CMS stated in the Final Rule for FY 2011:

> *"Under legislation passed in 2007, CMS is required to recoup the entire amount of FY 2008 and 2009 excess spending due to changes in hospital coding practices no later than FY 2012. CMS has determined that a -5.8% adjustment is necessary to recoup these overpayments. The -2.9% adjustment for FY 2011 is one-half of this amount.* "

The financial health of a hospital in terms of its Medicare inpatient margin may be greatly affected by this overall reduction in Medicare payments. CMS did not base their adjustment for coding changes on detailed examination of case level data, patterns of coding changes for specific diagnoses or procedures, or changes in assignment at the DRG level. The adjustments were made across the board so it is likely that some hospitals have been negatively affected by the 2.9 percent coding offset, while others may benefit from an under correction.

Purpose of Study

Examining a hospital's ability to accurately code CCs and MCCs after the implementation of MS-DRGs may be explained through shifts in CMI. A large positive shift in CMI may be indicative of higher Medicare inpatient margins and the overall financial health of a hospital. Exmining the ralationships regarding the type of hospital and shifts in CMI may indicate certain hospitals adapted better to coding CCs/MCCs. Thus, the purpose of this study was to investigate whether the coding offset of 2.9% was appropriate across the board for all hospitals and to see if the offset differed based on selected hospital demographics.

Examining relationships regarding the type of hospital and shifts in CMI may indicate certain hospitals adapted better to coding CCs/MCCs. Furthermore, determining the percent change in Medicare inpatient margin from the DRG system to the MS-DRG system among varying demographics of hospitals could indicate if the across-the-board

coding offset is an appropriate method for recouping overpayments as deemed necessary by Medicare.

It is important to note that the data used in this research involves Medicare claims information only, although there are many other payers with whom hospitals work to receive reimbursement.

Significance of Study

Clinical coding errors have an impact on reimbursement and the financial health of acute care inpatient hospitals. Depending on the nature of the error, CMS may be overpaying or underpaying hospitals for services provided to Medicare patients. Payments provided by CMS rely heavily on the hospital's CMI. This study examines how well hospitals adapted to coding CCs and MCCs after the implementation of MS-DRGs and if CMS appropriately recouped overpayments from their analysis of changes in coding not accurately reflecting real change in case mix. If hospitals did not adjust well to the implementation of MS-DRGs thousands of dollars may have been missed in reimbursement, and by CMS implementing a coding offset of 2.9 percent for all hospitals, there may be hospitals whose financial health is negatively impacted.

Reviewing the relationship between a hospital's Medicare inpatient margin and the adaptability of coding CCs and MCCs post MS-DRG implementation can prove the significance of coding accuracy and provide support for making improvements to clinical documentation and clinical coding in order to receive the most accurate payment from Medicare, especially since CMS is recouping payments from the first few years of MS-DRG classification. Furthermore, the method used in this research identifies specific

types of hospitals that are struggling with capturing the appropriate CCs and MCCs as reflected by CMI. If patterns and trends can be detected through data regarding changes in CMI after the implementation of MS-DRGs, hospitals can examine errors they have made and use the data as a basis for internal education in order to prevent future missed opportunities of reimbursement from Medicare.

Research Questions

The research questions that guided this study were:

1. Do hospitals differ in capturing CC and MCC codes based on the demographic variables of setting, bed size, and CMS region?
2. Is Medicare's coding offset appropriate for all demographics under study of acute care inpatient hospitals?
3. What is the estimated impact of over and under corrections for coding and documentation changes pre and post MS-DRG conversion?

Definition of Terms

The following terms are used throughout the study:

Case Mix Index (CMI): The single number that compares the overall complexity of the healthcare organization's patients to the complexity of the average of all hospitals.

CMS: Centers for Medicare and Medicaid Services.

ICD-9-CM: The current classification system used by hospitals and other healthcare facilities to index healthcare data in the United States.

Inpatient Prospective Payment System (IPPS): The CMS reimbursement system for inpatient services provided in an acute care setting. Payment rates are established in advance for a specific time period based on average levels of resource use for certain types of healthcare.

Healthcare Cost Report Information Systems (HCRIS): CMS data file containing annual reports submitted by institutional providers to Medicare. The cost reports are a true and accurate representation of the data on file at CMS.

Medicare Inpatient Margin: A hospital's inpatient payments from Medicare less the costs of the services provided to Medicare beneficiaries; expressed as a percentage of payments.

Study Limitations

A limitation of this study is the inability to access the medical records from which diagnoses were coded. The diagnosis codes assigned by the coders subsequently determine any CCs or MCCs with which a patient presents to the hospital. The CCs and MCCs have a direct relationship on a hospital's CMI, so this study can only rely on the data that the hospital submitted to CMS regarding its case mix and cannot verify the accuracy of each individual CMI. Furthermore, this study is relying on Medicare

inpatient claims data to determine the financial impact of transitioning from a DRG-based CMI to an MS-DRG-based CMI.

CHAPTER II

REVIEW OF LITERATURE

A review of literature was conducted to provide a foundation for understanding the existing relationship between clinical coding and the financial health of a hospital. Specifically, coding errors involving CC codes were investigated. The financial health of a hospital in this study is determined by Medicare's Hospital Cost Report, which examines the hospital inpatient margins. It was found that limited information exists on the specific relationships of this study; however, much of the literature review is pertinent to individual characteristics that are collaboratively examined in this study. The literature findings begin with a general examination of ICD-9-CM coding accuracy, followed by an analysis of CMI trends and effects on payment, and conclude with an investigation of Medicare inpatient margin tendencies.

Literature Findings

ICD-9-CM Coding Accuracy

Coding accuracy of ICD-9-CM diagnosis codes is vital for any healthcare facility. Diagnosis codes are assigned a DRG, which determines the payment rate to the hospital. O'Malley, et. al. (2005) most recently studied the potential sources of errors at each step of the ICD coding process. It was discovered that there were two main sources that accounted for coding errors: the "patient trajectory" and the "paper trail". The "patient trajectory" of errors was associated with a patient's progress through the healthcare system. A lack of quality information at admission, miscommunication between patients

and providers, clinician knowledge, and clinician attention to detail in terms of clarity and specificity were determined to be potential factors of error in the "patient trajectory" (O'Malley, et al. 2005). It was further concluded that coding errors contributed by the "paper trail" may occur as a result of variance between electronic and paper medical records, coder training and experience, and facility quality and control efforts. Furthermore, the most common coding error was found to be sequencing errors in hospital discharge abstracts as well as upcoding in which codes of higher reimbursement values are assigned (O'Malley, et al. 2005).

According to The National Diagnosis Related Group (DRG) Validation Study, an overall error rate of 2.8% was determined for DRG assignments (Fisher, et al. 1992). The Office of Inspector General of the United States Department of Health and Human Services conducted this study by randomly selecting 239 hospitals from each of the three bed-strata (excluding specialty hospitals). From the 239 hospitals, 30 Medicare discharges from each hospital were randomly selected. The medical records from these discharges were reviewed, coded, and assigned a DRG by accredited record technicians who were blinded to the original coding (Fisher, et al. 1992). Although no significant discrepancies were found in the DRG assignment, this study remains limited because it was designed to test the accuracy with which hospitals adhered to coding rules, and did not assess the validity of the claims data on the patients' true clinical status (Fisher, et al. 1992).

However, with data obtained from HCFA's (now, CMS) Office of Research Demonstration, a study conducted by Doremus and Michenzi (1983), did reveal significant discrepancies among DRG assignment from statistics of a 20% sample of

University Hospital of Cleveland Medicare patients. Similar to The National DRG Validation Study, medical records were re-abstracted for principal and additional diagnoses in order to analyze for diagnostic discrepancies which would lead to DRG disagreements and have an effect on reimbursement (Doremus and Michenzi 1983). The findings of this study indicated 32.1% of principal diagnoses were coded differently with only 34.8% agreement regarding additional diagnoses (Doremus and Michenzi 1983). Doremus and Michenzi stated that the discrepancies in the diagnoses were due to differences in wording of the principal diagnosis by the physician in the medical record notes and the discharge summary. The re-abstractors in this study were not permitted to look at the original discharge, only the notes in the medical record (Doremus and Michenzi 1983). The discrepancy was also due to a difference in the order in which the discharge diagnoses were listed in the notes along with several 4th digit coding errors. Furthermore, the re-abstractor listed more additional diagnoses that the physician had listed on the original discharge. These variations between the original and the re-abstracted data resulted in a different DRG classification for 61.1% of the patients in the study, with 51.1% of the re-abstracted records falling into a higher DRG weight (Doremus and Michenzi 1983). The additional complexity of MS-DRGs may lead to even higher error rates.

Case Mix Index Trends and Effects on Payment

The array of patients seen by a hospital determines a hospital's case mix. The resources required to treat the mix of patients at a given hospital must be considered when payment rates are established, so hospitals are not underpaid or overpaid for the

services provided to a particular patient. Reflecting the costliness of the mix of patients, CMI is computed by multiplying the proportion of Medicare patients in each DRG by the DRG's weight (Carter and Ginsburg 1985). The following variables are used most frequently to assign Medicare patients to DRGs: principal diagnosis, principal operating procedure, additional diagnoses and procedures, patient's age at admission, patient's sex, and discharge status (Grimaldi and Micheletti 1983). Changes in DRG case mix indices have large effects on the distribution of payments across hospitals.

When Medicare's inpatient prospective payment system (IPPS) plan went into effect on October 1, 1983, higher coding accuracy to achieve a higher weighted DRG induced approximately 80% of the changes in measured case mix (Coffey and Goldfarb 1992). Coffey and Goldfarb noted that implementation of the PPS resulted in an unprecedented rise in the average Medicare case mix index of hospitals. Between Fiscal Year (FY) 1981 and FY 1984, the average CMI increased by 6%, and between FY 1984 and FY 1988 the average CMI increased by 9% (Coffey and Goldfarb 1992). Coffey and Goldfarb's study aimed to distinguish the true changes in case mix, such as medical practices, aging of the hospitalized population, and seasonal factors, from factors that caused the case mix to rise as a result of IPPS implementation. The results from the study determined that coding practices accounted for 52% of the total change in the CMI of the 38 quarters that were studied from January 1980 to December 1986 (Coffey and Goldfarb 1992). Changes in coding practice raised the CMI due to the necessity of correct DRG assignment for accurate reimbursement. The true changes of the CMI accounted for 48% of total changes (Coffey and Goldfarb 1992).

A study by Carter and Ginsburg (1985) similarly tried to distinguish the true changes of case mix during this time. They obtained data on inpatient episodes for Medicare enrollees and found that the CMI did not increase monotonically with age, but increased with age throughout the younger age groups, but peaked at 70-74 years, followed by a decline (Carter and Ginsburg 1985). Prior to IPPS, data suggested a monotonic increase with age in the average reimbursement per discharge (Carter and Ginsburg 1985). This suggests that DRGs did not fully measure the increased resource needs of Medicare patients. Furthermore, it was found that changes in medical practice accounted for only a small portion of the overall increase in the CMI as 2.1 percentage points were attributed to the increase (Carter and Ginsburg 1985). It should be noted that Carter and Ginsburg did not find any significant associations of CMI increase with respect to the type of hospital under study (ex: teaching vs. non-teaching).

In a similar study conducted by Steinwald and Dummit (1989), it was concluded that there were several components to case mix change shortly after the PPS implementation. The term "DRG creep" became commonly used to refer to "changes in hospital record keeping practices to increase CMIs and reimbursement" (Steinwald and Dummit 1989). The components determined to affect changes in case mix included changes in coding practices, changes in patients across DRGs, and case-complexity change within DRGs.

In the early years of IPPS, coding practices were not uniform across hospitals. Steinwald and Dummit (1989) reported the results of a ProPAC survey of hospital medical record personnel in which more attention was paid to completing and coding the medical record since the beginning of IPPS. Physician narrative descriptions of diagnoses

and procedures improved with specificity, and physicians began to pay more attention to technical aspects of coding. Their study also examined CMI changes due to natural changes in patients across DRGs. This change reflects the changes in medical practice patterns that may be due to new technologies and treatments and changes in the proportions of patients who receive more or less intensive care than in the past (Steinwald and Dummit 1989). A key shift in this time was the decline of hospital admissions and the rise of outpatient treatments. In terms of case mix and DRGs, this meant that the less severe patients were transitioning to outpatient care while the more severe patients remained in the inpatient category. Thus, the frequency of lower weighted DRGs declined during this time relative to the high weighted DRGs (Steinwald and Dummit 1989).

Tendencies of the Medicare Inpatient Margin

The Inpatient Prospective Payment System (IPPS) is Medicare's predetermined payment to acute care hospitals for inpatient services. IPPS was originally meant to standardize the pay to hospitals for certain classifications of patients and to encourage hospital efficiency of inpatient care to Medicare patients (Schuhmann 2010). Relative weights reflect the expected costliness of cases of a particular complexity compared with the average of all cases. These weights contribute to the payment rate, which can be calculated as the product of the relative weight and the base payment rate (MedPAC 2012).

The difference between Medicare's payment to a hospital and the hospital's cost for service provided to a Medicare beneficiary divided by the payment is the Medicare

margin (MedPAC 2003). On the inpatient side of facilities, Medicare inpatient margins include the payments and costs for the services covered under IPPS (MedPAC 2003). Prior to the implementation of Medicare-severity adjusted DRGs (MS-DRGs), trends of Medicare margins suggested that, overall, the margins were trending downward, and variations in Medicare payments existed among different hospital types and among states. However, it has since been suggested that the method for determining pay for the inpatient setting does not truly account for differences in Medicare costs per discharge among hospitals and among states (Schuhmann 2010). Variations from state-to-state can be contributed towards differences in wage indices and case mix indices (Schuhmann 2010).

In a study conducted by Cost Report Data Resources it was found after examining more than 24,000 Medicare IPPS cost reports that Medicare margins for services paid under IPPS were declining during FY 2000 through FY 2007 while total operating margins and total net income percentages remained stable in acute care hospitals (Schuhmann 2007). The decline in Medicare inpatient margins while maintaining stable operating margins is indicative of payers other than Medicare having to subsidize more of the costs of treating Medicare beneficiaries (Schuhmann 2007). In other words, cost shifting was occurring during this time. Aside from overall trends, the study determined Medicare inpatient margins for urban hospitals declined more than rural hospitals, and teaching hospitals maintained a positive inpatient margin while nonteaching hospitals sometimes dipped into negative inpatient margins (Schuhmann 2007).

More recently, according to MedPAC's Report to Congress on Medicare's Payment Policy, inpatient margins have begun to rise since 2008. The adoption of the

new MS-DRGs in 2008 provided hospitals with the incentive to change diagnosis documentation and coding to better account for each patient's severity of illness (MedPAC 2012). MS-DRGs revised DRGs such that payments are more aligned with the resource intensity of a case. This led to an increase in CMI, which, in turn, generally resulted in an increase of payments to hospitals. MedPAC reports that there are three key factors that contribute to the growth in Medicare hospital payments per discharge under IPPS. These factors include: annual payment updates, changes in reported case mix, and policy changes that are not implemented in a budget-neutral manner (MedPAC 2012).

Chapter Summary

Limited research exists on the relationship of complication and comorbidity coding and the financial health of a hospital. However, the aforementioned review of literature was conducted to examine three key components of this study: ICD-9-CM coding accuracy, case mix index trends and its effects on payment, and the tendencies of the Medicare inpatient margins.

The results of past studies regarding clinical coding accuracy has proved that there may be many sources of errors in coding medical records, both intentional and unintentional. The accuracy of these codes is crucial in determining the payment rates to the healthcare facility and can easily influence reimbursement in a positive and negative manner.

The studies regarding case mix index have outlined the relativity of CMI to a facility's payment. The higher the risk pool of patients, the greater a hospital will be reimbursed to adequately finance the more complex and resource-intensive cases.

However, the studies that have been reviewed are limited because they were conducted in the 1980s when Medicare switched to a prospective payment system. Recent trends in CMI have not been closely examined.

Despite Medicare inpatient margins trending downward in the early 2000s, the most recent findings show a rise in margins due to the refinement of the DRG system to the MS-DRG system which uses complication/comorbidity (CC) diagnosis codes and major complication/comorbidity (MCC) diagnosis codes. Although these studies do not specifically look at the relationship of coding errors and its effects on the Medicare inpatient margin, it may still be concluded that coding accuracy is reflected by correct MS-DRG assignment, which is indicative of the CMI, which has a direct relationship the Medicare inpatient margin for hospitals.

CHAPTER III

METHODOLOGY

The methodology chapter will begin by discussing the research design, followed by the data collection procedures, and conclude with a discussion of data analysis.

Research Design

The research for this study was conducted through a secondary analysis of data used for the annual update of the IPPS system. The study examined whether hospital increases in CC and MCC coding increased the CMI of a hospital by examining their CMI and what Medicare's 2.9 percent take-back for FY 2011 to recoup overpayments as a result of the implementation of MS-DRGs had on these facilities. The Medicare's public data files that provide facility-level data used for the study were the Final Rule Impact File for FY 2009 and FY 2010 and the Healthcare Cost Report Information System (HCRIS) File for the corresponding years. The impact files are generally prepared in the summer preceding the Federal Fiscal year and are used to estimate the impact of the annual update to the IPPS in the Federal Register. The HCRIS data file provides annual facility-level utilization statistics, costs, charges, Medicare payments, and financial information to CMS of its Medicare Providers. According to CMS, the submission of an annual cost report covers a 12 month period of operations based on the provider's accounting year, and Medicare may stop payments to facilities who inaccurately file cost reports. The Medicare cost report is the only publicly available

source of financial performance data from hospitals and includes all payments and costs for the treatment of Medicare, Medicaid and all patients treated by the facility.

Although the first year of MS-DRG use for hospitals was FY 2009, this study was conducted using FY 2010 data to account for a transitional year to allow hospitals to become acclimated to MS-DRG coding and reimbursement.

Population and Sample Design

The population under study was acute care, non-teaching hospitals with 100 beds or more in the United States. Hospitals were immediately discarded from the data set if the CMI data elements or the inpatient margin statistics for either FY 2009 or FY 2010 were not reported in the files.

The study included hospitals with 100 beds or more because of the tendency of smaller hospitals to behave financially different from larger hospitals. Smaller hospitals experience lower activity, higher fixed costs, and lower buying power. Larger hospitals offer a fuller array of services, have the capability of treating more complex diagnoses with advanced therapeutic equipment, and treat a more complex and severely ill mix of patients.

This study determined the non-teaching designation as having a resident-to-bed-ratio of less than .25 in FY 2008. A preliminary data analysis indicated a pattern in teaching hospitals that proved to be very different in non-teaching hospitals including Medicare payment adjustments for teaching hospitals during the same timeframe of MS-DRG implementation. Teaching hospitals receive Direct Graduate Medical Education (DGME) payments and Indirect Medical Education (IME) adjustments for the higher

patient care costs of teaching hospitals. In FY 2009, FY 2010, and FY 2011, the IME adjustments increased per-case payments by 5.5 percent for approximately every 10 percent increase in the resident-to-bed ratio ("Acute Care Hospital Inpatient Prospective Payment System: Payment System Fact Sheet" 6). With too many variables to adequately account for within the domain of this study, it was determined to exclude teaching hospitals from the data set.

All acute care inpatient hospitals located in the state of Maryland were excluded from the study due to the state conforming to a different payment system for Medicare than the rest of the hospitals in the United States. The federal government exempted the state of Maryland from the national Medicare and Medicaid reimbursement system and are paid on the basis of the rates established by the Health Services Cost Review Commission (HSCRC) of Maryland ("HSCRC Overview ") The waiver hospital rate regulation in Maryland was created by an act of the 1971 Maryland legislature which established HSCRC committing them with the responsibilities regarding the public disclosure of hospital financial data ("Provider Audit & Reimbursement (Part A): Maryland"). HSCRC was given the authority to set hospital rates for all payers, and negotiations with Medicare obtained a waiver of federal law that required Medicare to pay Maryland hospitals on the basis of HSCRC-approved rates, effective July 1, 1977 (Provider Audit & Reimbursement (Part A): Maryland"). Maryland is the only state in the country that has a Medicare Waiver, thus its exclusion from this study.

Data Collection Procedures

The Medicare data files that were utilized for the study were the Final Rule Impact File for FY 2009 and FY 2010 and the Healthcare Cost Report Information System (HCRIS) File for the corresponding years. The datasets were collected from the CMS website at *www.cms.gov*.

Data Analysis

The purpose of the analysis is to investigate the relationships between a hospital's ability to adapt to coding CCs/MCCs after the implementation of MS-DRGs and the impact on policy changes enacted by CMS on the financial health of a hospital in terms of its Medicare inpatient margin. A subsequent investigation involved the effect of coding MS-DRGs on the type of hospital and determining if Medicare's coding offset during FY 2011 was appropriate for all demographics of acute care inpatient hospitals. Descriptive and inferential statistics were calculated to examine three research questions:

1. Do hospitals differ in capturing CC and MCC codes based on the demographic variables of setting, bed size, and CMS region?
2. Is Medicare's coding offset appropriate for all demographics under study of acute care inpatient hospitals?
3. What is the estimated impact of over and under corrections for coding and documentation changes pre and post MS-DRG conversion?

An alpha level of .05 was used to test for statistical significance.

Descriptive statistics were used to identify the demographic variability for the hospitals in the data set. Table 1 lists the hospitals according to bed size. Hospitals were divided into bed size co-horts based on quartiles.

Bed Size	Frequency	Percent	Cumulative Percent
1st Quartile (100-139 beds)	427	25.3	25.20%
2nd Quartile (140-194 beds)	417	24.7	50.10%
3rd Quartile (195-295 beds)	421	24.5	75.10%
4th Quartile (296+ beds)	420	24.9	100%
Total	**1685**	**100**	

Table 1: Descriptive Statistics for Bed Size

The Medicare Final Rule Impact File distinguishes hospital setting as large urban, other urban, and rural. For the purpose of this study, large urban and other urban were combined in to one category of "urban". Table 2 lists the hospitals in the data set according to setting.

Setting	Frequency	Percent	Cumulative Percent
Rural	233	13.8	13.80%
Urban	1452	86.2	86.20%
Total	**1685**	**100**	

Table 2: Descriptive Statistics for Setting

The Medicare Final Rule Impact File lists the hospitals according to CMS region, which is the same as U.S. census regions. Figure 1 displays the CMS regions and Table 3 lists the hospitals according to region.

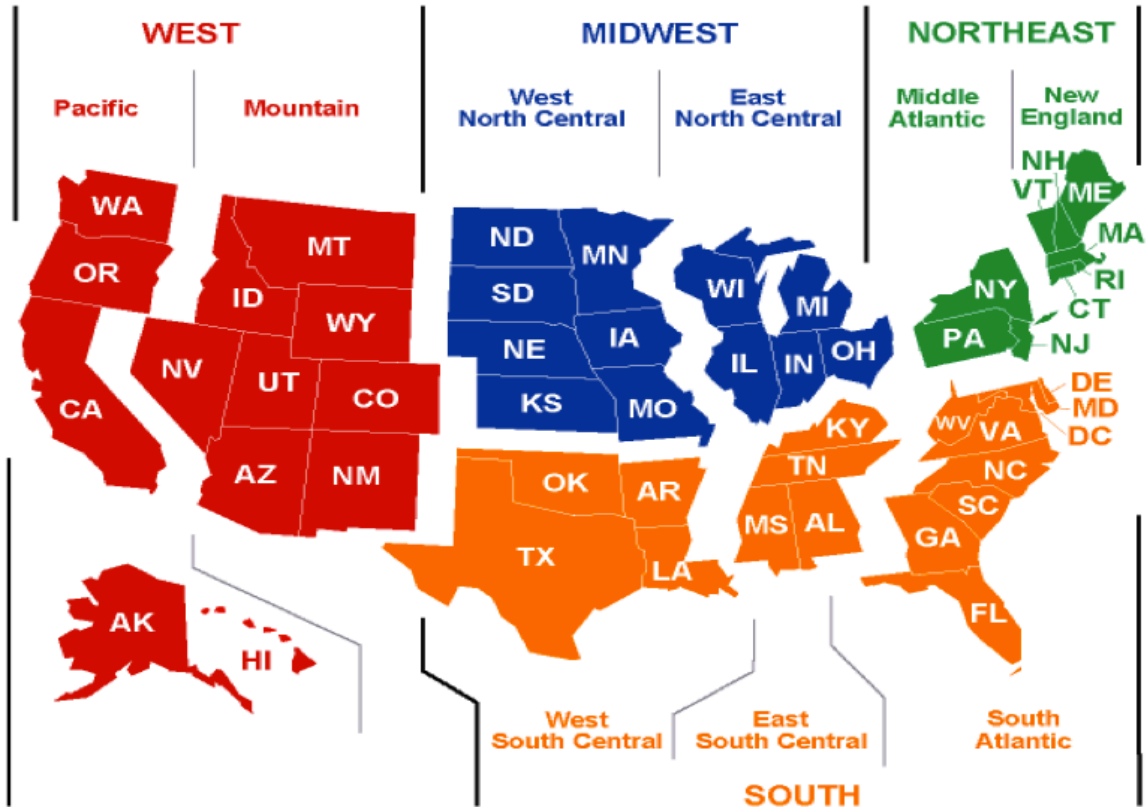

Figure 1: Geographical Region Groups by State
Source: U.S. Census (http://energyiq.lbl.gov)

Region	Frequency	Percent
East North Central	261	15.5%
East South Central	144	8.5%
Middle Atlantic	205	12.2%
Mountain	105	6.2%
New England	66	3.9%
Pacific	255	15.1%
South Atlantic	335	19.9%
West North Central	105	6.2%
West South Central	209	12.4%
Total	**1685**	**100**

Table 3: Descriptive Statistics for Region

Chapter Summary

Utilizing the Medicare Final Rule Impact File for FY 2009 and FY 2010 and the Healthcare Cost Report Information System (HCRIS) File, a descriptive research design was conducted to investigate potential relationships in Medicare inpatient margin and CMI shift after the implementation of MS-DRGs. In addition, inpatient margin shifts by hospital type were conducted to determine if variation exists that would prove that an across-the-board 2.9 percent coding offset was not appropriate for every hospital demographic. Three group characteristics of data used to address the study question are; type of hospital, inpatient margin shift, and CMI shift. The correlational study involves the impact file and HCRIS data, to determine the CMI shift variable and the inpatient margin shift for all non-teaching, acute care hospitals with 100 beds or more participating in the Medicare Hospital Inpatient Prospective Payment System.

Descriptive statistics demonstrate the percentage of hospitals that can be described by bed size, setting, and CMS region. Since there were hospitals that were discarded from the data set for lack of required data elements, generalizations must be

made that the sample results can be generalized to the entire population of non-teaching, acute care hospitals with 100 beds or more participating in the Medicare IPPS.

CHAPTER IV

RESULTS

The population of non-teaching, acute care hospitals with 100 beds or more participating in the Medicare IPPS (n=1,6485) was analyzed to determine the correlations between Medicare inpatient margin shift and CMI shift after the implementation of MS-DRGs. Results were obtained using SPSS and are presented by the research question.

Profile of Population

The population under study was non-teaching, acute care hospitals who submitted cost reports to the HCRIS file and the Final Rule Impact File for Federal Fiscal Year (FY) 2009 and FY 2010. Each year, the Impact File includes the previous year's CMI and the current year's CMI, so the Final Rule Impact File for FY 2009 provided the FY 2008 CMI data for this study. The hospital population for this study only included hospitals with a bed size of 100 beds or greater. As a result, the total sample used for data analysis was 1,685 hospitals. The majority of the hospitals under study were urban hospitals located in the South Atlantic region. Table 4 provides a summary of average CMI for FY 2008 and FY 2010 in addition to the percent change in CMI according to the categories of bed size, setting, and region.

Category	Avg. CMI FY08	Avg. CMI FY 10	Avg. % Change CMI
Bed Size	*n=1685*		
1st Quartile (100-139 beds)	1.3056	1.3431	2.95%
2nd Quartile (140-194 beds)	1.4073	1.4473	2.92%
3rd Quartile (195-295 beds)	1.4912	1.5282	2.54%
4th Quartile (296+ beds)	1.6215	1.6670	2.86%
Setting	*n=1685*		
Rural	1.3189	1.3494	2.40%
Urban	1.4779	1.5194	2.80%
Region	*n=1685*		
East North Central	1.4521	1.4909	2.75%
East South Central	1.4262	1.4566	2.14%
Middle Atlantic	1.3803	1.4161	2.66%
Mountain	1.5820	1.6354	3.55%
New England	1.3251	1.3744	3.90%
Pacific	1.4859	1.5337	3.30%
South Atlantic	1.4431	1.4866	3.12%
West North Central	1.5215	1.5669	3.11%
West South Central	1.4834	1.5088	1.68%
Total	**1.4559**	**1.4959**	**2.83%**

Table 4: Summary of Case Mix Index FY 08 and FY 10, and Average Change in Case Mix Index by Hospital Group Distribution

Do hospitals differ in capturing CC and MCC codes based on the demographic variables of setting, bed size, and region?

For all hospitals involved in the study, the total average of percent change in CMI was 2.83 % with a standard deviation of 4.34%.

Bed Size

Table 5 shows the first quartile range of 100-139 beds having the greatest shift in average CMI from pre-implementation of MS-DRG coding to post-implementation of MS-DRGs at 2.95% with a standard deviation of 5.53 %.

Bed Size	Hospitals (n)	Average CMI Shift	Standard Deviation
1st Quartile (100-139 beds)	427	2.95%	5.53%
2nd Quartile (140-194 beds)	417	2.92%	4.22%
3rd Quartile (195-295 beds)	421	2.54%	3.97%
4th Quartile (296+ beds)	420	2.86%	3.34%
Total	**1685**	**2.83%**	**4.34%**

Table 5: Average Percent Shift in CMI among Bed Sizes with Standard Deviation

When comparing hospitals by bed size, the results, as seen in Figure 2, did not demonstrate statistical significance between bed size groups when comparing the average shift in CMI among bed size quartiles.

ANOVA

Percent Shift in CMI

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.735	3	11.578	.613	.607
Within Groups	31744.631	1681	18.884		
Total	31779.366	1684			

Figure 2: ANOVA Test for Statistically Significant Differences in Average CMI Shift Among Bed Size

Setting

Urban hospitals experienced a higher average percent shift in CMI (2.90%, SD=4.33%) as compared to rural hospitals (2.40%, SD=4.40%) (Table 6). However, the percentage may be an artifact of the number of urban hospitals (1452) compared to rural (233). An independent sample t-test for equality of means was conducted to determine if there was a difference in average CMI shift between hospital settings of urban and rural. No statistically significant difference was found (see Figure 3). Levine's test for equality of variances revealed no significance either (.103) so it can be concluded that there are equal variances.

Setting	Hospitals (n)	Average CMI Shift	Standard Deviation
Rural	233	2.40%	4.40%
Urban	1452	2.80%	4.33%
Total	**1685**	**2.83%**	**4.34%**

Table 6: Average Percent Shift in CMI by Setting with Standard Deviation

Independent Samples Test							
t-test for Equality of Means							
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
% Change in CMI—Equal variances assumed	-1.632	1683	.103	-.50013%	. 30643%	-1.101%	.1009%

Figure 3: T Test for Statistical Significance of Average Percent Change in CMI by Setting

CMS Region

When comparing the hospitals in the population according to region, a statistically significant difference in average CMI shift was found between the groups through the use of an ANOVA test, seen in Figure 4. The West South Central region experienced a statistically significant change in average CMI when compared with the Mountain, New England, Pacific, and South Atlantic regions using the Tukey's HSD post hoc test (see Figure 5).

ANOVA

CMI Percent Shift

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	573.631	8	71.704	3.851	.000
Within Groups	31205.735	1676	18.619		
Total	31779.366	1684			

Figure 4: ANOVA test for Statistical Significance of Average Percent Change in CMI by Region

CMI Percent Shift

Tukey HSD

Region Name	N	Subset for alpha = 0.05		
		1	2	3
West South Central	209	1.6834%		
East South Central	144	2.1434%	2.1434%	
Middle Atlantic	205	2.6586%	2.6586%	2.6586%
East North Central	261	2.7468%	2.7468%	2.7469%
West North Central	105	3.1073%	3.1073%	3.1073%
South Atlantic	335	3.1229%	3.1229%	3.1229%
Pacific	255		3.2991%	3.2991%
Mountain	105		3.5476%	3.5476%
New England	66			3.9042%
Sig.		.101	.121	.248

(I) Region Name	(J) Region Name	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
West South Central	East North Central	-1.0634%	.40053%	.165	-2.307	.1806
	East South Central	-.49529%	.46732%	.987	-1.911	.9914
	Middle Atlantic	-.97518%	.42416%	.343	-2.293	.3422
	Mountain	-1.8641%	.51615%	.009	-3.467	-.2611
	New England	-2.2208%	.60926%	.008	-4.113	-.3286
	Pacific	-1.6157%	.40262%	.002	-2.866	-.3652
	South Atlantic	-1.4395%	.38035%	.005	-2.621	-.2582
	West North Central	-1.4239%	.51615%	.129	-3.027	.1792

Figure 5: Post Hoc Test for Determining which Regions are Statistically Significantly Different from Each Other

Figure 6 depicts the regions in order of least shift in CMI to greatest shift in CMI after the implementation of MS-DRGs. Regionally, New England, Mountain, and Pacific experienced the greatest percent shift in CMI after MS-DRGs were implemented, and West South Central, East South Central, and Middle Atlantic experienced the least percent shift in CMI. All regions experienced a positive shift in CMI.

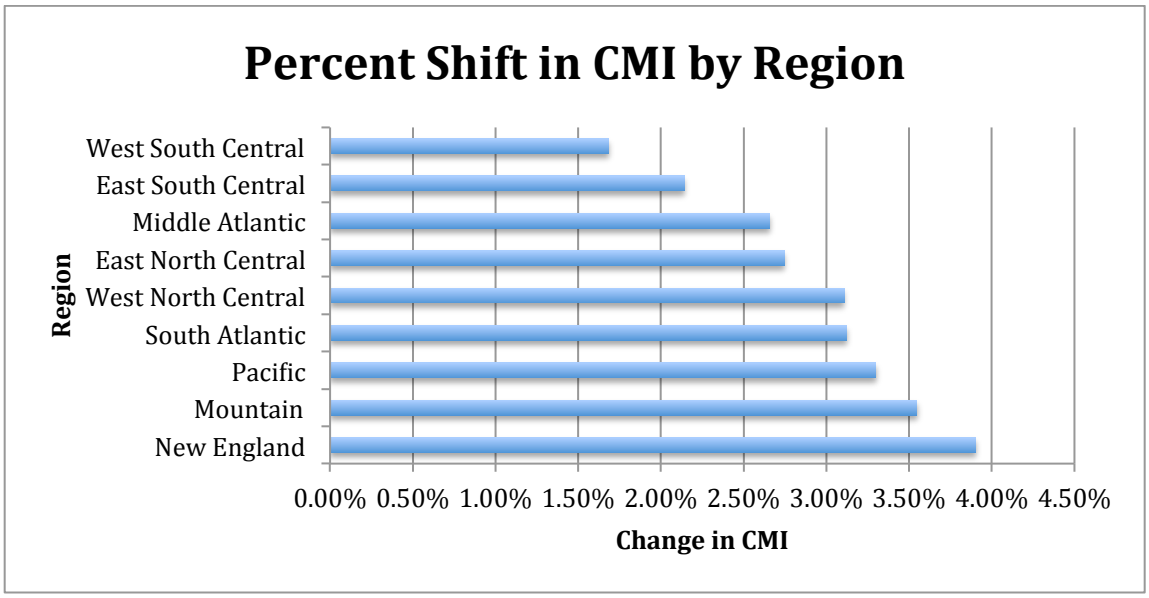

Figure 6: Percent Shift in CMI by Region

New England, having the least number of hospitals under study in the region, saw the greatest shift in CMI of 3.90% with a standard deviation of 3.92% (see Table 7). The West South Central region experienced the least shift in CMI at 1.68% with a standard deviation of 5.04%.

Region	Hospitals (n)	Average CMI Shift	Standard Deviation
West South Central	209	1.68%	5.04%
East South Central	144	2.14%	4.09%
Middle Atlantic	205	2.66%	3.64%
East North Central	261	2.75%	3.67%
West North Central	105	3.11%	4.28%
South Atlantic	335	3.12%	3.79%
Pacific	255	3.30%	5.33%
Mountain	105	3.55%	4.77%
New England	66	3.90%	3.95%
Total	**1685**	**2.83%**	**4.34%**

Table 7: Average Percent Shift in CMI by Region with Standard Deviation

Is Medicare's coding offset appropriate for all demographics of acute care inpatient hospitals?

Medicare issued a 2.9 percent coding offset in FY 2011 to recoup payments for what was believed to be an increase in CMI due to better coding and documentation practices after the implementation of MS-DRGs, rather than a CMI increase due to the severity of patients being treated. This study determined statistically significant changes in CMI among regions; therefore, the subsequent data for the remainder of the study is presented to show the regional impact of the 2.9 percent coding offset.

CMS determined that, nationally, hospitals should have seen the CMI from FY 2008, pre MS-DRGs, increase by 2.9 percent for FY 2010, post MS-DRGs. Table 8 shows the average CMI in FY 2008, the expected CMI for FY 2010 if a 2.9 percent increase were true for all hospitals, and the actual CMI in FY 2010.

Region	Hospitals (n)	Average CMI FY 2008	Average Expected CMI FY 2010 (assuming a 2.9% increase)	Average Actual CMI FY 2010
East North Central	261	1.4521	1.4942	1.4909
East South Central	144	1.4262	1.4676	1.4565
Middle Atlantic	205	1.3803	1.4203	1.4160
Mountain	105	1.5820	1.6279	1.6353
New England	66	1.3251	1.3635	1.3744
Pacific	255	1.4859	1.5290	1.5337
South Atlantic	335	1.4431	1.4849	1.4865
West North Central	105	1.5215	1.5656	1.5668
West South Central	209	1.4840	1.5270	1.5088
Total	**1685**	**1.4559**	**1.4981**	**1.4958**

Table 8: Variance of Actual 2010 CMI and Expected 2010 CMI (if 2.9% increase is true)

What is the estimated impact of over and under corrections for coding and documentation changes pre and post MS-DRG conversion?

The revenue impact was calculated for each region to determine the significance of the 2.9 percent coding offset issued by Medicare in FY 2011. A fixed base rate of $5000 was used in this example to treat all regions equally for the purpose of calculating impact. Medicare reimbursement is adjusted for location via CBSA-specific wage index in the actual calculation of payment. That factor was not used in this estimate, since it would bias the impact estimate down in regions where there is a higher proportion of hospitals located in rural areas. The formula used to determine the revenue impact for each hospital is:

*CMI Variance * Claims Volume * Base Rate = Revenue Impact for Hospital*

After the revenue for each hospital was calculated, the revenue impacts were summed according to region. Table 9 presents the findings of the revenue impact for each region.

Region	Hospitals (n)	Average CMI Shift	Over / Under Estimation of CMI Shift by CMS	FY 2010 Claims Volume	Revenue Impact
East North Central	261	2.75%	(0.0033)	1,236,158	$ (20,463,978)
East South Central	144	2.14%	(0.0111)	672,478	$ (37,187,361)
Middle Atlantic	205	2.66%	(0.0043)	910,356	$ (19,703,290)
Mountain	105	3.55%	0.0074	353,178	$ 13,106,436
New England	66	3.90%	0.0109	272,075	$ 14,790,133
Pacific	255	3.30%	0.0047	788,528	$ 18,565,497
South Atlantic	335	3.12%	0.0016	1,661,164	$ 12,874,852
West North Central	105	3.11%	0.0012	522,326	$3,072,583
West South Central	209	1.68%	(0.0182)	899,456	$(82,012,398)
Total	**1685**	**2.83%**	**(0.0023)**	**7,315,719**	**$ (84,902,577)**

Table 9: Revenue Impact of 2.9% Coding Offset

Four of the nine regions saw a negative impact on revenue due to Medicare's coding offset. This indicated that CMS overcorrected its payment take back in four regions including the East North Central, East South Central, Middle Atlantic, and West South Central regions.

Chapter Summary

SPSS was used to analyze the data to gain further understanding of three questions;

1. Do hospitals differ in capturing CC and MCC codes based on the demographic variables of teaching status, setting, bed size, and CMS region?
2. Is Medicare's coding offset appropriate for all demographics under study of acute care inpatient hospitals?

3. What is the estimated impact of over and under corrections for coding and documentation changes pre and post MS-DRG conversion?

Hospital group results show a statistically significant change in CMI between hospital regions. The Tukey HSD post hoc test revealed that the West South Central region experienced a statistically significant change in average CMI when compared with the Mountain, New England, Pacific, and South Atlantic regions. No additional statistical significance was found among hospital groups for average percent change in CMI.

A revenue impact was calculated for each region to determine the significance of the 2.9 percent coding offset issued by Medicare in FY 2011. Results revealed that CMS overcorrected its payment take backs in four out of nine regions including the East North Central, East South Central, Middle Atlantic, and West South Central regions.

CHAPTER V

DISCUSSION

Change in CMI and Medicare inpatient margin in acute care, non-teaching inpatient hospitals with 100 beds or more that receives Medicare reimbursement across the United States were evaluated for differences between pre MS-DRG coding and reimbursement to post MS-DRG implementation. This study was conducted using FY 2010 data regardless of FY 2009 being the first year that MS-DRGs were implemented to account for a transitional year of using the MS-DRG system. A summary of the study results, conclusions, implications of the study, and recommendations are discussed in this chapter.

Summary of Findings

For all hospitals involved in the study, the total average percent change in CMI was 2.83% with a standard deviation of 4.34%. One statistical significant relationship was identified among the hospital groups when change in CMI was analyzed. Statistical significance was found among regions when comparing change in CMI from FY 2008 to FY 2010, after MS-DRG coding and reimbursement was implemented. Shift in CMI was positive in all nine regions. The demographic variable of bed size and hospital setting did not reveal any statistical significance regarding the change in CMI.

The West South Central region experienced a statistically significant change in average CMI when compared with the Mountain, New England, Pacific, and South Atlantic regions. New England, Mountain, and Pacific experienced the greatest percent

shift in CMI after MS-DRGs were implemented, and West South Central, East South Central, and Middle Atlantic proved the least percent shift in CMI. Although the New England region has the least number of hospitals under study, the region experienced the greatest shift in CMI of 3.9043%. The West South Central region CMI shift, which was proven to be statistically significant from four of the eight additional regions, experienced the least shift in CMI at 1.6834%.

The total average percent change in Medicare inpatient margin among all hospitals involved in the study was -14.629% with a standard deviation of 1091.0%. There were no statistical significant relationships identified among hospital groups for change in Medicare inpatient margin.

Regionally, there were no statistical significance differences among region in change in Medicare inpatient margin. Five of the nine hospital regions demonstrated a positive shift in Medicare inpatient margin, and four of the nine hospital regions resulted in a negative shift in margin.

Conclusions and Implications of the Study

Conclusions of this study are presented in order by research question.

Do hospitals differ in capturing CC and MCC codes based on the demographic variables of setting, bed size, and CMS region?

Hospitals differ in capturing CCs/MCCs upon transitioning to MS-DRG based on certain types of demographics. Study results showed that hospitals experienced a similar change in CMI when analyzed by bed size split by quartiles, therefore not proving a statistical significant difference among the bed size quartiles. In terms of hospital

classification of urban and rural settings, a statistical significant shift in CMI was not indicated between the two groups. When comparing differences in CMI shift by geographic region, hospitals in the New England regions show to experience the highest shift in CMI, and hospitals in West South Central regions experience the lowest shift in CMI. The West South Central region shift in CMI was significantly lower than CMI shift in the New England, Mountain, Pacific, and South Atlantic regions.

Is Medicare's 2011 coding offset appropriate for all demographics under study of acute care inpatient hospital?

A 2.9 percent coding offset was implemented by CMS to recoup increased payments that were made to hospitals during FY 2008 and FY 2009 as a result of MS-DRG implementation. The coding offset was an across-the-board adjustment in which all hospitals under study received a 2.9 percent cut in hospital payment from Medicare. The results of the study showed that based on regional location statistically significant changes in CMI were found among regions. The hospitals in the East North Central, East South Central, Middle Atlantic and West South Central regions did not see its CMI life by at least 2.9 percent, and the hospitals in the Mountain, Pacific, South Atlantic, New England and West North Central regions saw its CMI shift over 2.9 percent.

What is the estimated impact of over and under corrections for coding and documentation changes pre and post MS-DRG conversion?

The 2.9 percent reduction in payment resulted in an overcorrection for the East North Central, East South Central, Middle Atlantic, and West South Central regions, resulting in an unfair recoupment of payments for hospitals in those regions. The sum of the revenue impact that the coding offset had on these specific regions was an

overcorrection of $159,367,027. The regions of New England, Pacific, Mountain, and South Atlantic, West North Central experienced an under correction from Medicare's coding offset in which $62,409,501 was under-corrected among these regions. Overall, the coding offset had negatively impacted revenue in total by $84,902,577.

Based on the findings of this study, adding an across the board 2.9% coding offset for all regions of the nation is not accurately representative of the changes in CMI from FY 2008 to FY 2010, resulting overcorrections in four of the nine regions. An adjustment that is a constant percentage for all hospitals penalizes the hospitals that did not see its CMI lift by at least 2.9 percent.

Recommendations

1. Investigate teaching hospitals.

This study excluded teaching hospitals due to limitations in the ability to account for various payment adjustments that were occurring with teaching hospitals during the same time as MS-DRGs were implemented. Further research may examine teaching hospitals regarding the impact of MS-DRG implementation and the hospital's Medicare inpatient margin, while accounting for Direct Graduate Medical Education and Indirect Medical Education adjustments to identify possible trends among various demographics of teaching hospitals. Medicare's 2.9 percent coding offset included hospitals with a teaching designation, so further research may support that an across the board coding offset is not appropriate among teaching hospitals.

2. Investigate small hospitals with less than 100 beds.

Hospitals with fewer than 100 beds were excluded from this study due to the different financial behavior of small hospitals in comparison to larger hospitals. An investigation of small hospitals will allow for a more even comparison of financial and demographic variables among the population under study. Similar to what was noted with Medicare's 2.9 percent coding offset affecting teaching hospitals, hospitals with fewer than 100 beds are also included in the coding offset. Again, trends among small hospitals may be identified regarding the CMI change after the implementation of MS-DRGs and the impact on Medicare inpatient margin, and the effect of the coding offset on hospitals within this population.

3. Incorporate Medical Record Review. As mentioned previously, a medical record review was not conducted to verify the diagnosis codes assigned by the coders, which subsequently determine a patient's CCs or MCCs and impact the hospital's CMI. Using a smaller sample of the population under study and conducting a medical record review of the sample would allow the researcher to confirm the accuracy of the hospital's CMI and evaluate if the hospitals are treating more severe patients or if there is an occurrence of "DRG creep" in which coding practices increase CMI and reimbursement.

Summary

Examining the relationship between a facility's ability to document and code CCs and MCCs based on changes in CMI after the implementation of MS-DRGs and the financial health of a hospital in terms of Medicare inpatient margin has allowed for identifying concerns with CMS's IPPS FY 2011 final rule that declared a coding offset of 2.9 percent to recoup increased payments that were made to hospitals during FY 2008

and FY 2009 as the result of MS-DRG implementation. The results presented in this study suggest that an across the board offset is not appropriate regionally among the hospitals in the nation. Opportunities may exist to re-examine a fairer method to recoup payment based upon geographic location of hospitals.

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